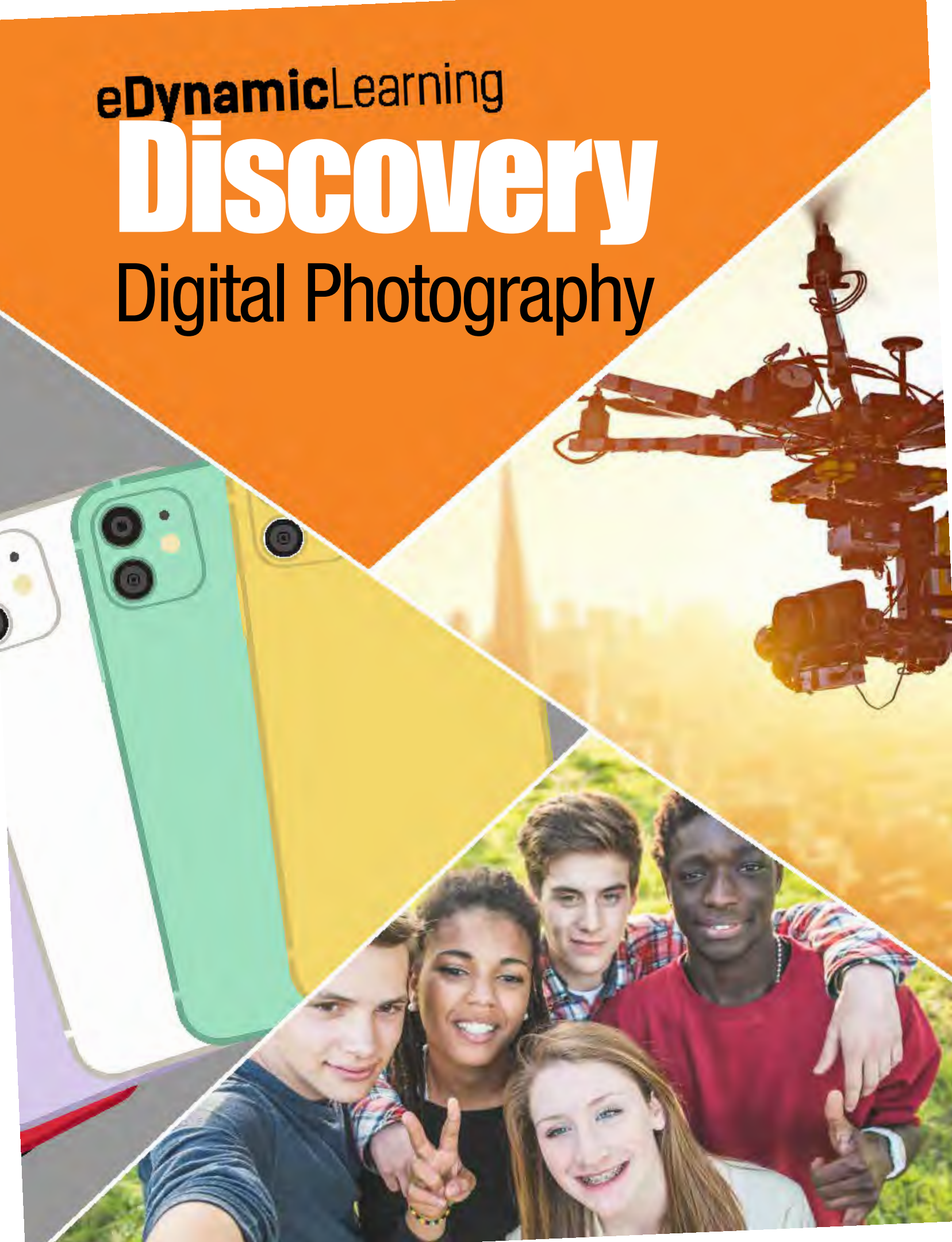


eDynamic Learning

Discovery

Digital Photography





What Lies Beneath

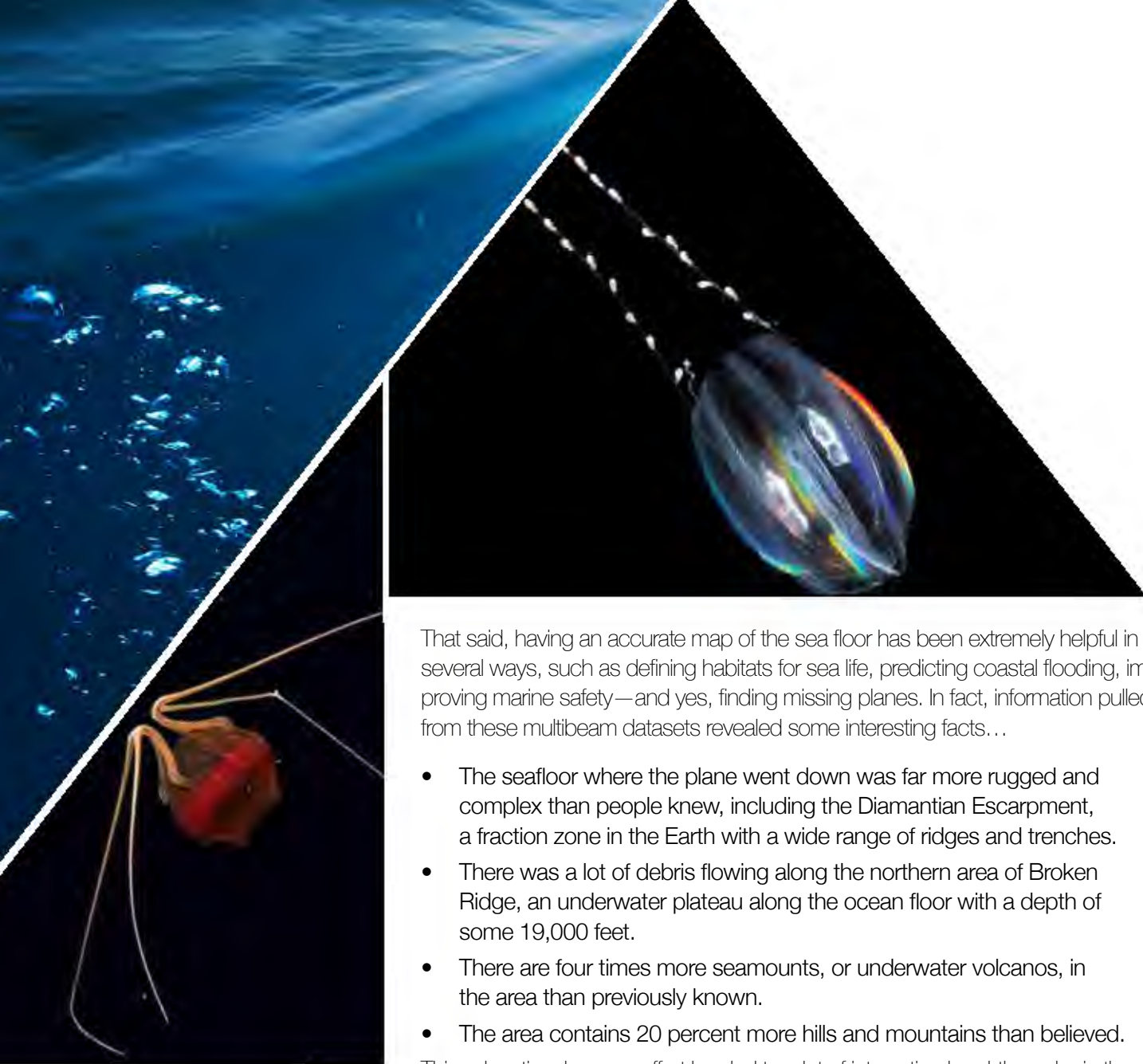
On March 8, 2014, something crazy happened. Malaysia Airlines flight 370 disappeared from the radar over the Indian Ocean. Like, poof—gone. No one could figure out where the plane went—not the airline, not the control tower, and, sadly, not any of the many people waiting on the ground for its arrival. And after weeks of intense searching, no wreckage was ever found. To this day, no one is sure what happened to the Boeing 777—or to the 239 passenger and crew members who were on board. Obviously the airplane went down somewhere over the sea, but because we still know so little about the ocean floor, searching for existing wreckage was basically impossible.

In fact, the ocean floor remains one of the biggest mysteries on the planet. Most of the Earth's surface is covered by water, yet we only understand about 5 percent of what that hidden land really looks like. To complicate things, the section of the Indian Ocean where flight 370 disappeared is still mostly uncharted, even today. This means searching for the lost plane required some basic mapping of the ocean floor before any sort of retrieval effort could begin.

You might be wondering what any of this has to do with digital photography. Good question. Thanks to scientists who study the physical and biological elements of the ocean, or **oceanographers**, the world is starting to learn more about such undiscovered areas using digital photography. For example, an international team equipped with over 100 high-tech ships was able to map 140 million miles of the world's ocean floor using this method. The effort was made possible by the invention of **multibeam bathymetry**, sonar device technology that sends multiple sound beams to the seabed to create digital images. These machines can map thousands of square miles of the sea floor at one time, but it is not a particularly fast process. In the case of the Malaysia flight, the area in need of study was about the size of New Zealand. But even with such advanced technology, it will still take these ships about 13 years—and a whole lot of spending—to finish this work.

▶ **oceanographer:** a scientist who studies the physical and biological elements of the ocean

▶ **multibeam bathymetry:** a device that sends multiple sound beams to the ocean floor and creates digital images of biological elements of the ocean



That said, having an accurate map of the sea floor has been extremely helpful in several ways, such as defining habitats for sea life, predicting coastal flooding, improving marine safety—and yes, finding missing planes. In fact, information pulled from these multibeam datasets revealed some interesting facts...

- The seafloor where the plane went down was far more rugged and complex than people knew, including the Diamantian Escarpment, a fracture zone in the Earth with a wide range of ridges and trenches.
- There was a lot of debris flowing along the northern area of Broken Ridge, an underwater plateau along the ocean floor with a depth of some 19,000 feet.
- There are four times more seamounts, or underwater volcanos, in the area than previously known.
- The area contains 20 percent more hills and mountains than believed.

This educational rescue effort has led to a lot of interesting breakthroughs in the use of digital imaging and has even extended to the world of shipping. Since mapping technology is becoming more affordable, experts in the field are hoping cargo ships and other vessels on these shipping routes can imbed digital technology onto their ship's surfaces to continue this type of deep-sea mapping in the future.

Pushback from the Pipeline

Surprisingly, not everyone is thrilled at the thought of knowing more about the ocean floor. For instance, part of what protects the seabed from mining and drilling is the fact that we can't dig into what we don't understand. Critics of such environmentally-charged activities fear such imaging will create a race to exploit these underwater resources. Even though oceanographers acknowledge these risks, they argue there is much to gain from undersea mapping.

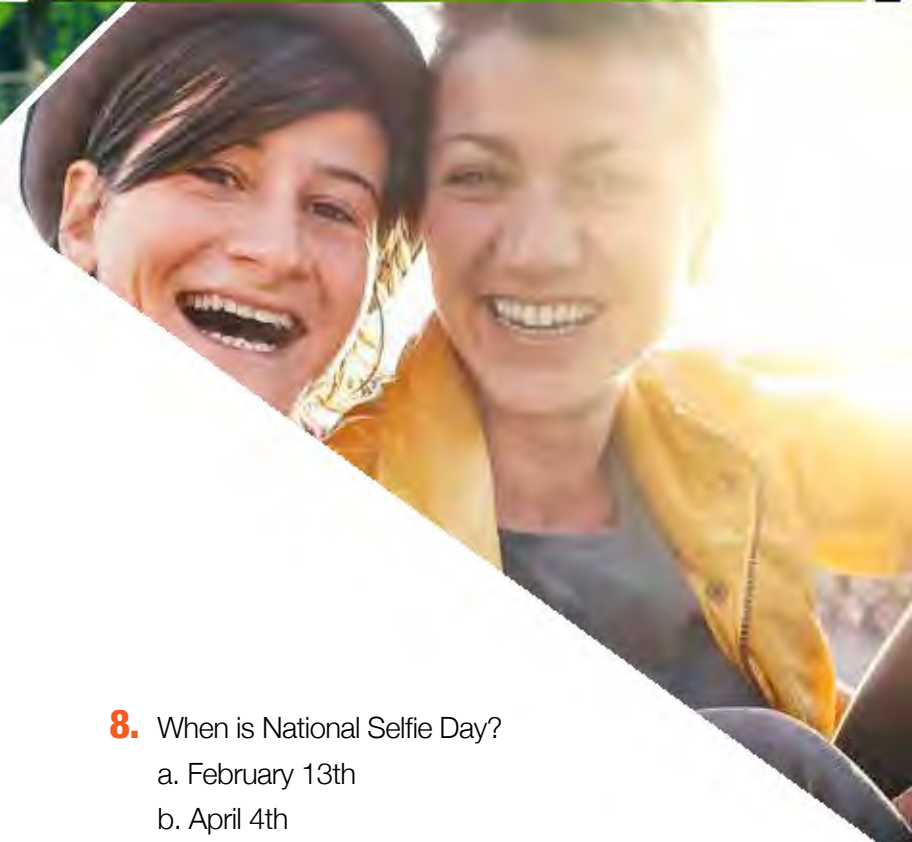




Getting to Know Your Selfie

We all know them, love them, take them. But how well do you know—the selfie? Ready to test *yourself*?

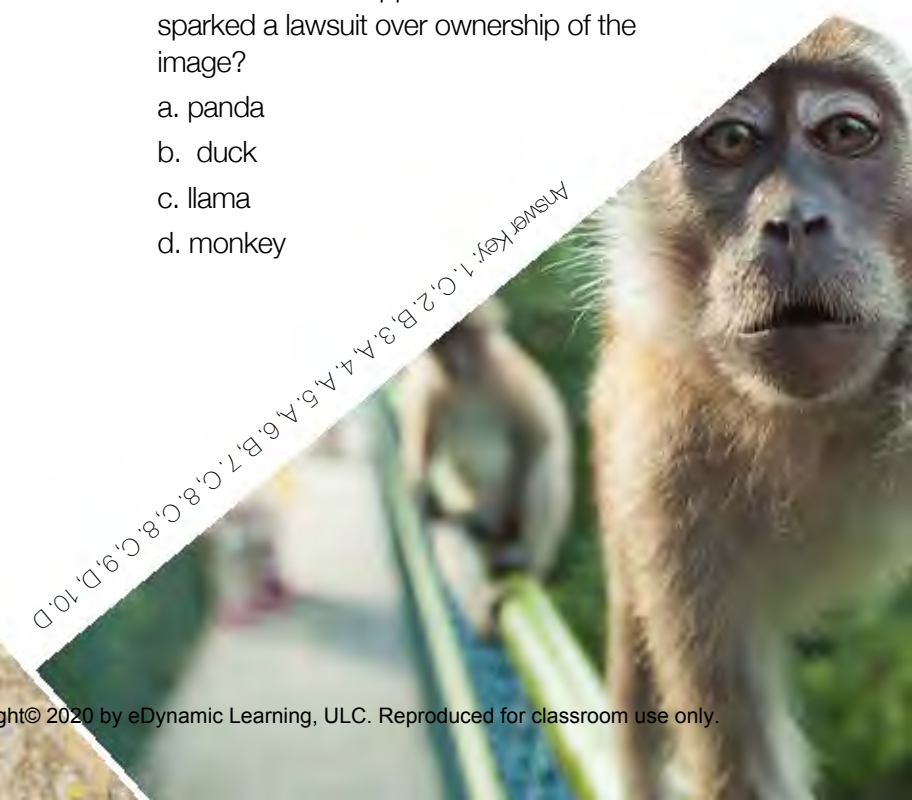
- 1.** In what year did the Oxford English Dictionary unanimously choose “selfie” as Word of the Year?
 - a. 1991
 - b. 2003
 - c. 2013
 - d. 2019
- 2.** In which two American cities are the most selfies taken?
 - a. Atlanta and Austin
 - b. Miami and Manhattan
 - c. Los Angeles and Las Vegas
 - d. San Francisco and San Diego
- 3.** What percentage of photos posted online are selfies?
 - a. about 4 percent
 - b. about 10 percent
 - c. about 50 percent
 - d. about 80 percent
- 4.** Which of these super-touristy spots has actually banned the use of selfie sticks?
 - a. Disney resorts
 - b. US National Parks
 - c. Super Bowl tailgate parties
 - d. Macy’s Thanksgiving Day Parade
- 5.** On average, women take more selfies than men. Which of these countries has the biggest gender divide with respect to selfies, with women taking 82 percent and men taking only 18 percent?
 - a. Russia
 - b. France
 - c. Ukraine
 - d. The United States



- 6.** As of 2018, how many people in the world have died while taking dangerous selfies?
- a. 83
 - b. 259
 - c. 1,894
 - d. 23,451
- 7.** As of 2018, which singular selfie has enjoyed the most shares and retweets?
- a. singer Beyoncé at Coachella in 2018
 - b. astronaut Aki Hoshide orbiting in space in 2012
 - c. talk show host Ellen Degeneres at the Oscars in 2014
 - d. reality star Kim Kardashian and her daughter, North West, in 2013

- 8.** When is National Selfie Day?
- a. February 13th
 - b. April 4th
 - c. June 21st
 - d. December 20th
- 9.** In selfie world, the *duck face*, the *fish gape*, and the *smize* are all examples of what?
- a. filters
 - b. dance moves
 - c. camera angles
 - d. facial expressions

- 10.** Which animal snapped a selfie and sparked a lawsuit over ownership of the image?
- a. panda
 - b. duck
 - c. llama
 - d. monkey



Answer Key: 1. C, 2. B, 3. A, 4. A, 5. A, 6. B, 7. C, 8. C, 9. D, 10. D

Influencer Academy

Digital photography has changed the game in many ways, including the rise of the **influencer**. This is a person who attracts potential buyers of a product or service by sharing (mostly visual) content on social media platforms like Instagram and Facebook. Celebrities have long defined trends of all kinds through formally and informally promoting certain products. But now almost anyone can take quality digital photos anywhere and garner their own influencer-like status. This wouldn't be possible without the carefully-curated images provided by digital photography.



While being an influencer sounds like an easy way to get noticed, it takes more than just a few posts on social media to make it work. Top influencers make a fulltime job of it, and those big paychecks only come (if they come) after months or even years of building a platform. Sure, being a great photographer helps a lot, but it is only part of what it takes to be a social media giant. Let's take a peek behind the curtain to see what the best influencers know about making it big...

influencer: a person who attracts potential buyers of a product or service by sharing on social media

Find a market.

Every influencer has a **niche**, or a specific, specialized section of a market they target, like make-up, travel, or food. But in the big, wide world of the web, it is important to narrow this category down to something more specific and niche-like. Instead of just "food," a cooking influencer might be the "Ramen Aficionado" or the "Cupcake Princess." This creates place for people as passionate as you to geek out on something super specific—which builds trust and affinity with your audience. As long as you're passionate about it, really any specific category will work.

Create a brand.

Knowing the basics of digital photography will make your images stand out. That said, influencers need to go beyond the details of a single photo; they must create a look, a "brand," for their accounts. They need to choose a few key elements to create a theme, like bright colors or black and white. As long as the thematic look is done with intention, the pictures will complement the brand.

niche: a specific, specialized section of a market





Find a way to stand out.

While you don't need a degree to be an expert, your niche should reflect your personal background. Have you been attending major league baseball games since you were a toddler? Has a disability made you an expert on how to travel well with mobility issues? Perhaps you make it a point to find the best donut in every town you visit? These kinds of biographical details will help your brand and lend credibility to the niche you choose.

Create a story.

Images draw attention, but it's the stories that keep followers coming back. Work your captions to build a narrative and establish your voice. How did you get to where you are today? What kind of obstacles have you overcome? Where you can encourage your audience from personal experience?

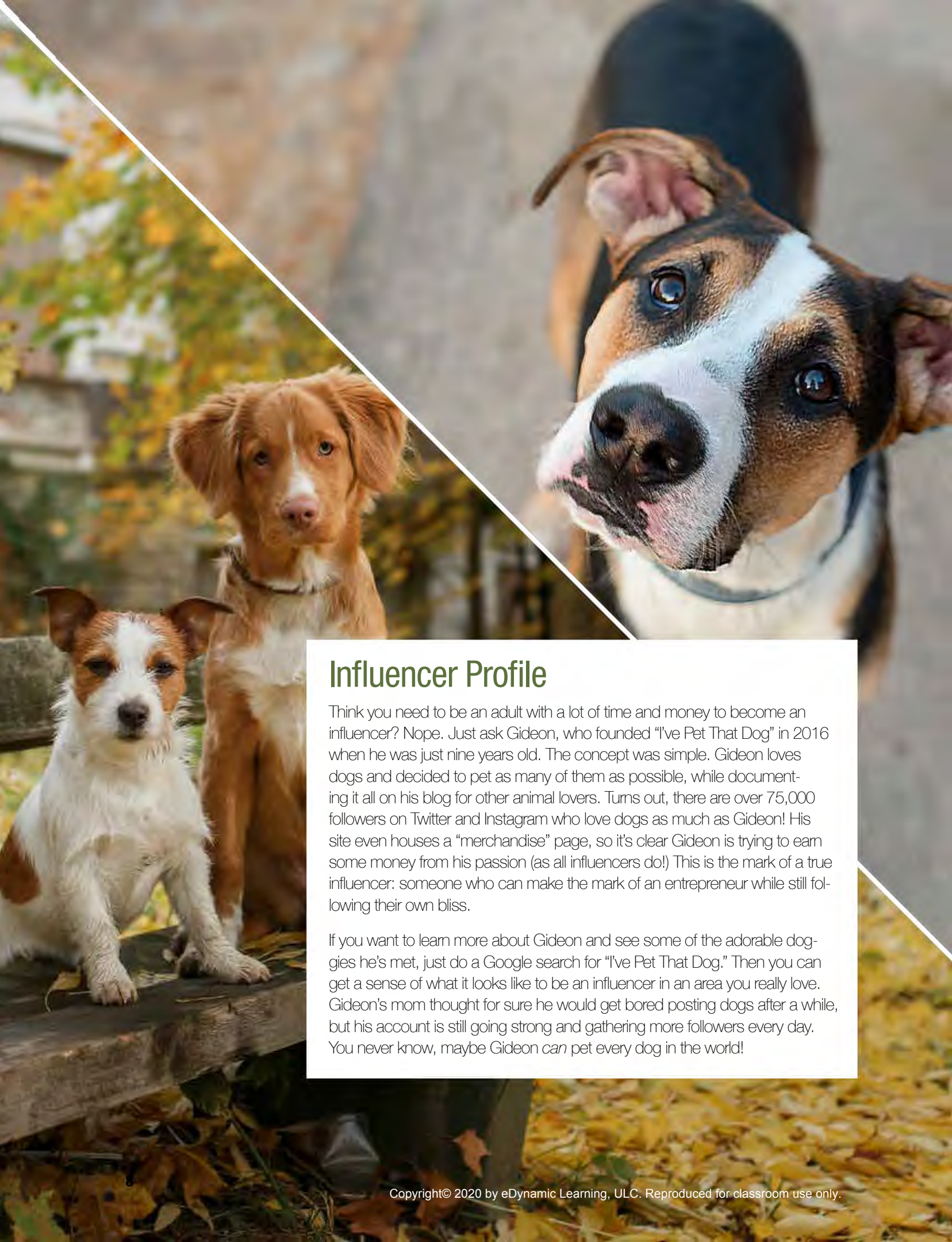
Be authentic.

While you can probably get away with faking it online in the beginning, it won't work in the long run. A follower's connection to an influencer's personality is what keeps the account popular and profitable. If fans feel like you are faking it, they won't stick around. So if you plan to be an influencer on the subject of vintage comics, for instance, you'll only get respect if you can talk about the *Green Lantern* and *Marvel Mystery Comics* with true passion and knowledge.

Create a schedule and stick to it.

It takes consistency to become an influencer, so make sure you pick a manageable schedule you can maintain. Whether you post a few times a day or once a month will depend on your niche, but it will also depend on you. If you live in Texas and decide to do a downhome BBQ thing, it will be easier to keep the content flowing if you move around to different local hot spots. If you are going for exotic travel, you'll need to make sure you keep your schedule full of enviable trips while also generating the money to keep them coming. The good news is, any schedule can work as long as you stick to it.





Influencer Profile

Think you need to be an adult with a lot of time and money to become an influencer? Nope. Just ask Gideon, who founded “I’ve Pet That Dog” in 2016 when he was just nine years old. The concept was simple. Gideon loves dogs and decided to pet as many of them as possible, while documenting it all on his blog for other animal lovers. Turns out, there are over 75,000 followers on Twitter and Instagram who love dogs as much as Gideon! His site even houses a “merchandise” page, so it’s clear Gideon is trying to earn some money from his passion (as all influencers do!) This is the mark of a true influencer: someone who can make the mark of an entrepreneur while still following their own bliss.

If you want to learn more about Gideon and see some of the adorable doggies he’s met, just do a Google search for “I’ve Pet That Dog.” Then you can get a sense of what it looks like to be an influencer in an area you really love. Gideon’s mom thought for sure he would get bored posting dogs after a while, but his account is still going strong and gathering more followers every day. You never know, maybe Gideon *can* pet every dog in the world!

Aerial Shots: Taking Pictures from The Sky

When digital cameras met drones, it was the beginning of a long and fruitful relationship of photography, perspective, and art—and it changed the way we think about **aerial photography**. But it may surprise you to learn, the process of taking pictures from high up in the air actually began much earlier than this modern union... Can you guess all the ways this could have happened? How the Tech Evolved...

▶ **aerial photography:**
pictures taken from the air

1906

A kite! George Lawrence went to the next level with his aerial shots by attaching his camera to a kite, which he then flew into the sky immediately after the famous earthquake in San Francisco. By launching 17 cameras some 2,000 feet in the air, he was able to capture the jaw-dropping damage on film.

1858

Hot air balloon! French photographer Gaspar Félix Tournachon is thought to have been the first person to dream up the idea of aerial pictures—but sadly, his photographs have since been lost to time. The oldest *surviving* photographs from a hot air balloon are of the city of Boston taken in 1860 by James Wallace Black.

1903

A rocket! And a carrier pigeon! That's right—German engineer Alfred Maul actually sent a camera up into space and cleverly rigged it to snap images as it parachuted its way back to Earth. Around the same time, German pharmacist Julius Neubronner was busy strapping cameras to carrier pigeons, so the route they flew to deliver prescriptions could be photographed along the way.

1908

An airplane! The Wright brothers invented this flying machine in 1903, and before long, Wilbur Wright piloted a small plane over France while his companion, L.P. Borvillian, snapped some amazing aerial shots.

Who's Used These Methods?

Once word got out that cameras could photograph all sorts of things from the sky, people started to think less about *how* and more about *what* they would capture on film—and even more interesting, *why* those pictures would be useful. Can you imagine a few?

1914-1919

Airplanes, cameras, and World War I came together to introduce a military strategy known as aerial **reconnaissance**. Flying high above enemy territory and snapping pictures allowed the military to understand more about these areas and how best to handle key things like troop movement, timing, and battle location.



▶ **reconnaissance:** military observation of a region to locate enemies or develop a strategy



1946

After World War II, a period of tension known as the Cold War began between the United States and the Soviet Union. This rivalry sparked a competition between the two nations to see who could most quickly dominate the realm of space technology and travel. This was the year we saw the first known photograph from space—and from a captured Nazi rocket no less!



1939-1945

Photography, particularly moving pictures, had moved forward a lot by the time World War II started. By then, aerial photography had found its way into **newsreels**, which at the time were short films shown in theaters before a movie—kind of like a preview but with major news instead of trailers. Since TV hadn't been invented yet, these news blasts provided a great way to update the public on recent events.



▶ **newsreel:** a short film updating the public on major news events that was shown before movies in theaters

1966

As part of the Space Race, NASA captured black and white images of the Earth's surface while orbiting the moon in "Lunar Orbiter 1," the first American spacecraft to achieve such a feat. They also took pictures of the moon's surface that would later be used to successfully complete the first moon landing.



1972

During the last mission of NASA's Apollo program, Apollo 17 traveled to the moon and delivered the first photograph of the entire earth as seen from space. Known as the "blue marble" picture, it changed how we see our planet and has become one of the most iconic pictures ever taken.



1980s

The type of drones we know today were developed by the Israeli military in the 1980s. Thanks to improvements in digital photography, these unmanned aircraft were able to capture higher-resolution images, which made them ideal for reconnaissance missions.

Today

Since military efforts created the first drones, technology has improved considerably—and the cost has come down a lot. Drones are now both available and affordable to everyone from hobbyists to professional photographers. Thanks to drones, digital photography has taken flight in industries like real estate, wedding photography, and even Hollywood film-making. And don't forget all the helpful ways aerial photography has affected history, from identifying archeological sites to rescuing lost hikers to mapping geographical sites!



A young person with curly hair is wearing a VR headset and smiling, with their right hand raised in a gesture. In the foreground, a pair of hands is holding a smartphone. The background is a blurred outdoor setting with greenery and purple flowers.

The Future of Digital Photography

The Greek philosopher Heraclitus once said, “Change is the only constant in life.” And boy, was he right. Digital technology is changing everything we do, all the time, and in many unpredictable ways. Can you think about how some of the changes will affect our lives down the line? Here are a few predictions to ponder...

Immersive Experiences

Virtual reality has been one of the fastest growing technologies in the past decade, so it's only a matter of time before the world of photography also becomes an immersive experience. The same technology that allows you to strap on special goggles and enter a fantasy world is likely the one that will also allow you to share a vacation with a friend—even if you are still at home!


Integrated Technology

Have you ever arrived at the grocery store, only to realize you forgot your list? What if you could grab your smartphone and actually *look* inside your fridge to see what you need to buy? Today, it is possible to buy a refrigerator with an internal camera that does just this.



Artificial Intelligence

Digital cameras are already getting better at figuring out what the focus of an image should be. As **artificial intelligence (AI)**, or computer systems that perform tasks usually done by humans, improves, cameras will become even “smarter.” For example, AI technology cuts down on post-production editing by recognizing when someone in a photo is blinking and correcting it immediately, on the spot. AI can also understand where the focus of a photo should be, making certain decisions automatically for the photographer.

 **artificial intelligence (AI):** computer systems able to perform tasks usually done by humans

The End of the Compact Camera

Camera sales are declining, largely because photographic features on smartphones have been steadily improving. This means small, portable digital cameras no longer have much place in our lives. Anyone who carries a newer smartphone also carries a super high-quality digital camera, and this technology is only slated to get better and better.

Mirrorless Cameras

Mirrors inside of cameras allow photographers to look through the view finder and see the image the camera will capture. However, technology is eliminating this feature, making mirrorless cameras increasingly common. They are lighter, smaller, and able to capture better quality images.

What's not to love?



Is Seeing Believing?

Like most people, you've probably edited a picture before posting it online—cropping out something you don't like, making the image brighter, or maybe even making yourself look better! Fear not, altering pictures is nothing new; the practice has been around almost as long as photography itself.

In 1865, famous Civil War photographer Matthew Brady doctored a now iconic image of Union General William Tecumseh Sherman and his officers by adding a commander, Francis P. Blair, to the photograph. That's right, he added a whole person! This same strategy of adding or removing individuals from photographs also happened with other famous leaders like China's Mao Zedong and even Adolf Hitler. Editing is an important part of digital photography—but the question is, *can it go too far?*

Today, photographs of celebrities are frequently edited, sometimes with their permission, sometimes not. Some stars have spoken out against this practice, criticizing the way it creates false ideals in the public's minds. Actress Kate Winslet was one of the first to protest against this practice when she was digitally "slimmed down" for a 2003 cover of *GQ* magazine. Professional tennis player Andy Roderic had similar concerns about an image of himself on the cover of *Men's Fitness* that removed a birthmark and exaggerated the size of his biceps. More recently other celebrities, including Zendaya, Lady Gaga, Bella Thorne, and Jameela Jamil, have called out publishers for posting images of them that were heavily altered. All of these celebrities agreed such modified images misrepresented their bodies and promoted unrealistic beauty expectations for everyone.



Aside from a few unhappy stars, editing photographs can create even bigger problems. Images spread quickly on the internet, and in many cases, false images are accepted as reliable. For instance, after the 2016 presidential election, Cameron Harris, a cash-strapped recent college graduate, created a false story about election fraud. By altering an image from a British news source, he was able to pass it off as evidence of voter fraud in the presidential election results from the state of Ohio. Although his trick was eventually discovered, the story was blasted out to an estimated 6 million people, earning him over \$22,000 in advertising revenue as people viewed the webpages where the photo was hosted.

Spotting Fake Photographs

So, how *can* you tell if an image is real or fake? Even experts will say this is tricky. That said, there are a few clear indications that an image has been altered. Next time you're on social media or cruising the internet, keep an eye out for these tell-tale signs of image tampering:

Are there wavy or warped background areas?

Let's say *Vogue* magazine decided to trim a model's waist. Not totally unheard of, but digitally altering the image is also going to change the background by creating waves or obvious breaks. This is particularly obvious if there is a straight line, like a doorframe or window, behind the model. A real pro knows how to fix these glitches, so it's not a perfect strategy—but still a basic error you will see often.






Are the edges real?

When an image has been altered, there will often be visible edges around an object in the picture that have been purposefully placed there to make it look more natural. But if you look closely, or even enlarge the image, it becomes easier to see the added edge marks.

Is everything focused?

If the shot is a landscape or something with a lot of depth, the part in the **foreground**, or front of the picture, should be more focused than what's in the background. Professional photographers know how to shift the focus to highlight one aspect of the photograph. But if everything is equally clear, this can be a sign that the foreground and the background are not from the same original photograph.

 **foreground:** the part of a view that is closest to the observer

Is the lighting consistent?

Lighting is one of the trickiest aspects to edit since it affects everything in the picture. If the lighting in one section is slightly different than another, like brighter or darker, this is usually a sign of image tampering. Generally, if one area of the picture is oddly brighter than another, it's time to be suspicious.

Is the skin “flawless”?

No one is perfect, not even top models. So, if you can't see a person's pores up close or any texture lines on their skin, it's pretty clear the image has been doctored to look flawless. Even though these

touch-ups are done to benefit the model, not everyone is a fan. In fact, the popular singer Lorde has pointed out these attempts to “fix” her acne in published images, making a point to let fans know that is not her real face. Brava, Lorde!

Is it possible?

Sometimes you see an image on the internet, and all you can think to yourself is, “no way that is real!”. If an image covers a controversial topic or one involving a high-profile individual, the stakes are high, so chances are higher that the picture you are seeing has been manipulated. Reputable news sources always ensure their photos are authentic (or admit the error if they’re not), but any other images are really fair game for editing.

Is it original?

Many altered photos are pulled from the internet, so it is usually pretty easy to find the original. One way to do this is to perform an image search (go to “Search by Image”) on Google and upload the photo into the search box. Then, Google will scour the internet for that same image and find whatever matches, which often includes the pre-edited (ahem, original) version.

So... is it possible to fool technology?

In the end, not really. These days, software programs can detect almost any alteration made to a digital photo. This technology traces the origins of a photo using **metadata**, identifying information contained in an image file. This set of data contains additional details on things like where the file was created and last edited. As technology becomes more advanced and accessible, it will also become harder (if not totally impossible) to fool “smart” devices and pass edited images off as originals.

▶ **metadata:** data that gives information about other data

Key Terms

aerial photography: pictures taken from the air

artificial intelligence (AI): computer systems able to perform tasks usually done by humans

foreground: the part of a view that is closest to the observer

influencer: a person who attracts potential buyers of a product or service by sharing on social media

metadata: data that gives information about other data

multibeam bathymetry: a device that sends multiple sound beams to the ocean floor and creates digital images

newsreel: a short film updating the public on major news events that was shown before movies in theaters

niche: a specific, specialized section of a market

oceanographer: a scientist who studies the physical and biological elements of the ocean

reconnaissance: military observation of a region to locate enemies or develop a strategy

Sources for Digital Photography

“12 Most Popular Selfies Ever for World Selfie Day.” (21 June 2018). Retrieved from news.sky.com.

Almanza, A. (n.d.). “14 Mind-Blowing Facts about Selfies.” Retrieved from www.rd.com.

Barker, S. (7 Feb. 2018). “How to Become an Instagram Influencer and Start Earning Money Now.” Retrieved from medium.com.

Bernhard, A. (18 Apr. 2018). “The Quest to Map the Mysteries of the Ocean Floor.” Retrieved from www.bbc.com.

Blakemore, E. (23 Aug. 2016). “Fifty Years Ago, This Photo Captured First View of the Earth from the Moon and Earth View of Itself Changed Forever.” Retrieved from www.smithsonianmag.com.

Chiu, A. (3 Oct. 2018). “More Than 250 People Worldwide Have Died taking Selfies, Study Finds.” Retrieved from www.washingtonpost.com.

Clark, N. (16 May 2018). “This Nine-Year-Old Who Pets Dogs Is the Purest Thing on the Internet.” Retrieved from www.vice.com.

Davis, B. (13 Aug. 2017). “5 Predictions for the Future of Photography.” Retrieved from www.digitalrev.com.

Forbes Agency Council. (18 Sept. 2018). “Want to Become an Influencer? Follow These 13 Tips.” Retrieved from www.forbes.com.

Frischkorn, K. (13 July 2017). “Why the First Complete Map of the Floor Is Stirring Controversial Waters.” Retrieved from www.smithsonianmag.com.

Grigonis, H.K. (29 May 2018). “Can You Spot a Photoshopped Picture? Here Are Nine Ways to Identify a Fake Photo.” Retrieved from www.digitaltrends.com.

May, T. (24 Aug. 2018). “100 Best Photography Quotes from Famous Photographers.” Retrieved from <https://www.digitalcameraworld.com>.

Picard, K., et al. (1 Jan. 2018). “Malaysia Airlines flight MH370 search data reveal geomorphology and seafloor processes in the remote southeast Indian Ocean.” Retrieved from <https://www.sciencedirect.com/science/article/pii/S0025322717303304>.

Picard, K., Brooke, B and M.F. Coffin. (6 March 2017). “Geological Insights from Malaysia Airlines Flight MH370 Search.” Retrieved from <https://eos.org/science-updates/geological-insights-from-malaysia-airlines-flight-mh370-search>.

Saltarin, A. (31 March 2014). “MH370 search continues: Is the missing Malaysian Airline on the Broken Ridge 19000 ft. underwater?” Retrieved from <https://www.techtimes.com/articles/4999/20140331/mh370-search-continues-is-the-missing-malaysian-airline-on-the-broken-ridge-19000-ft-underwater.htm>.

Shane, S. (18 Jan. 2017). “From Headline to Photograph, a Fake News Masterpiece.” Retrieved from www.nytimes.com.

“Top 10 Doctored Photos: Photographers Have Been Manipulating Images Since the Medium Was Invented.” Retrieved from content.time.com.

United States Geological Survey. (n.d.). “California Seafloor Mapping Program.” Retrieved from www.usgs.gov.

Waxman, O.B. (30 May 2018). “Aerial Photography Has Changed the World. Drones Are Just the Latest Example.” Retrieved from www.time.com.

Willet, M. (28 March 2018). “4 Ways to Tell If a Picture Was Photoshopped Just by Looking at It.” Retrieved from www.insider.com.

Yang, L. (1 March 2019). “18 Celebrities Who Have Spoken Out Against Photo Editing.” Retrieved from www.insider.com.

